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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

ED 059303

GATB Study #659C

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

Baser (elec. equip.) 7-00.070

Threader (electronics) 7-00.024

B-240 S-27

This report describes research undertaken for the purpose of determining General Aptitude Test Battery (GATB) norms for the occupations of Baser (elec. equip.) 7-00.070 and Threader (electronics) 7-00.024. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores	
A - Aiming (B-1001)	75	
K - Motor Coordination (B-1002)		75
F - Finger Dexterity	90	85
M - Manual Dexterity	85	80

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RESEARCH SUMMARY

Samples:

Sample I

34 female Basers employed at the Memphis Lamp Works of General Electric Company, Memphis, Tennessee.

Sample II

28 female Threaders employed at the General Electric Company, Tell City, Indiana.

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Technical Report on Development of USES Aptitude Test Battery

For .....

Baser (elec. equip.) 7-00.070

Threader (electronics) 7-00.024

B-240

or

S-27

U.S. Employment Service
in Cooperation with
Indiana and Tennessee State Employment Security
Revised November 1965

Criterion:
Production records

Design:
Concurrent (test and criterion data were collected at approximately the same time.)

Minimum Aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity:
Phi Coefficient = .35 ($P/2 < .005$)

Effectiveness of Norms: Only 74% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 88% would have been good workers. 26% of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 12% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

	Effectiveness of Norms	
	Without Tests	With Tests
Good Workers	74%	88%
Poor Workers	26%	12%

SAMPLE DESCRIPTION

Size:

Sample I - N=34
Sample II - N=28
Combined Sample - N=28

Occupational Status: Employed workers

Work Setting:

Sample I
Workers were employed by the Memphis Lamp Works of General Electrice Company, Memphis, Tennessee.

Sample II
Workers were employed by the General Electric Company, Tell City, Indiana.

Company Selection Requirements:

Education: Sample I and II-Eight grade education required with a preference for high school graduates.

Previous Experience: Previous experience was not mandatory in either company.

Tests: None

Other: Interview

Principal Activities: The job duties for each worker are comparable to those shown in the job descriptions in the Appendix.

Minimum Experience: All workers in the sample had completed 2 months on - the - job training.

TABLE 2a

Sample I (Tennessee) N=34

Means, Standard Deviations (SD) Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for age, Education, and Experience

	Mean	SD	Range	r
Age (years)	24.4	3.8	18-32	-.113
Education (years)	10.4	1.5	8-12	.590**
Experience (months)	10.3	2.3	6-13	.253

** Significant at the .01 level

TABLE 2b

Sample II (Indiana) N=28

Means, Standard Deviations (SD) Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for age, Education, and Experience

	Mean	SD	Range	r
Age (years)	23.0	4.2	18-32	.269
Education (years)	10.4	1.5	8-12	-.412*
Experience (months)	26.3	22.0	2-87	.356

*Significant at the .05 level

EXPERIMENTAL TEST BATTERY

All tests of the GATB, B-1001 were administered in 1949 (Sample I) and 1950 (Sample II).

CRITERION

The criterion for Sample I consisted of combined weekly average adjusted hourly earnings for two weekly periods-three weeks appart. The criterion for Sample II consisted of the average performance rate for twenty working days immediately preceeding the time the experimental battery was administered.

Criterion dichotomy: the criterion distribution was dichotomized into low and groups by placing 26% of the combined sample in the low group to correspond to the percent of workers considered to be unsatisfactory, or marginal workers. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers."

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitude	Rationale
A - Aiming	Necessary in such operations as threading wires through base prongs of radio tubes, positioning wires and placing finished tube on conveyor.
T - Motor Speed	Necessary in the quick and accurate use of tweezers in threading operations.
F - Finger Dexterity	Necessary in the use of fingers for all phases of straightening, threading and guiding wires into proper prongs of base of lamps or radio tubes.
M - Manual Dexterity	Necessary in the use of arm and hand movements in placing finished product on moving conveyor.

TABLE 4a
Sample I (Tennessee) N=34
Means, Standard Deviations (SD) Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Aptitude	Mean	SD	r
G - Intelligence	90.3	15.0	.309
V - Verbal	87.3	14.0	.283
N - Numerical	91.1	17.9	.216
S - Spatial	94.3	18.3	.214
P - Form Perception	92.0	17.2	.289
Q - Clerical Perception	83.0	14.6	.269
A - Aiming	90.1	17.0	.449**
T - Motor Speed	87.3	17.4	.469**
F - Finger Dexterity	108.6	19.3	.533**
M - Manual Dexterity	97.0	17.0	.499**

**Significant at the .01 level

TABLE 4b
Sample II (Indiana) N=28
Mean and Standard Deviations (SD) for the Aptitudes of the GATB
(no significiant correlations with the criterion)

Aptitude	Mean	SD
G - Intelligence	98.6	13.7
V - Verbal	92.6	12.2
N - Numberical	100.9	15.5
S - Spatial	102.0	15.6
P - Form Perception	109.2	21.0
Q - Clerical Perception	99.6	13.7
A - Aiming	95.3	15.3
T - Motor Speed	94.2	14.2
F - Finger Dexterity	99.4	15.3
M - Manual Dexterity	105.1	16.7

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of aptitudes A, T, F and M at trial cutting scores were able to differentiate between the 74% of the sample considered good workers and 26% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about one third of the sample with three aptitude norms. For two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about 1/3 of the sample: for four-aptitude trial norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about 1/3 of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of A-75, F-90 and M-85 provided the highest degree of differentiation. The validity of these norms is shown in Table 5 and is indicated by a Phi Coefficient of .35 (statistically significant at the .005 level).

TABLE 5

Concurrent Validity of Test Norms, (B-1001), A-75, F-90, M-85

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	16	30	46
Poor Workers	12	4	16
Total	28	34	62

Phi Coefficient (ϕ) = .35
Significance Level = $P/2 < .005$

Chi Square (X^2) = 7.750

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-35 which is shown in Section II of the Guide to the Use of the General Aptitude Test Battery. OAP-35 has the following minimum aptitude scores: K-85, F-80 and M-80.

A-P-P-E-N-D-I-X

JOB DESCRIPTIONS

Job Title: Baser 7-00.013

Work Performed: Attaches metal base to wire lamp to form completed Christmas tree lamp.

With hand and arm movements picks up a wire lamp in one hand and a metal base with the other hand. Then with rapid and dextrous finger movements fits cement-filled base over the seal of the wire lamp, threads one projecting wire through the hole in the base, and bends the other projecting wire over the edge of the base.

Places assembled product in one of the spindles of the Basing Machine which slowly carries it through an even and past mechanical attachments thus baking the cement and cutting and soldering the wires in an appropriate manner.

Inspects the lamps for quality by noting their lighting, and listens for machine noises indicative of faulty machine operation. Notifies Maintenance Mechanic if machine adjustments appear necessary.

Job Title: Threader 7-00.024

Work Performed: Straightens wires with tweezers and threads them through base prongs of radio tubes. Picks up tube from conveyor with left hand and holds with wires up. Pulls wires straight and positions each wire using tweezers. Transfers tube to right hand and picks up base from conveyor with left hand, holding prongs down. Guides tube with right hand so that wires will go into proper prongs of base. Presses tube into base. Pulls wires taut and twists them, using tweezers in right hand. Places finished tube on conveyor with left hand as counter button is pressed with right hand, causing conveyor to move along.